

1. Course Name:					
DATA STRUCTURES					
2. Course Code:					
3. Semester / Year:					
First Semester/ 2025-2026					
4. Description Preparation Date:					
15/11/2025					
5. Available Attendance Forms:					
Weekly (Theory: 2 hours, Practically: 2 hours, Tutorial: 1 hour)					
6. Number of Credit Hours (Total) / Number of Units (Total)					
Theory: 30 Hours Practically: 30 hours Tutorial: 15 hours Total: 75 hours Total Units: 6					
7. Course administrator's name (mention all, if more than one name)					
Dr. Suphian M Tariq					
8. Course Objectives					
Course Objectives	1-Understand the fundamental concepts of data structures and their importance in programming. 2-Learn about linear data structures, such as arrays, linked lists, stacks, and queues. 3-Study non-linear data structures, including trees (binary trees, binary search trees, AVL trees, etc.) and graphs. 4-Analyze the time and space complexities of various data structure operations. 5-Implement data structures using programming languages and apply them to solve real-world problems. 6-Learn about algorithms for searching, sorting, and traversing data structures.				
9. Teaching and Learning Strategies					
Strategy	Lectures (Theoretical and Practical) 1-Enhance the student's ability to build programs. 2- Discussion. 3- Brainstorming 4- Projects 5-Develop these programs				
1. Course Structure					
Course Description Form					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method

1	Th.:2H Pr.: 2H Tu.:1H	Understand the concept of data structures and their importance. • Distinguish between types of data structures and choose the suitable	Introduction to Data Structures: - How to choose the suitable data structure - Types of data structures	Lect. & Lab.	Exam
2	Th.:2 H Pr.: 2H Tu.:1H	-Understand memory representation. - Learn the concept of Abstract Data Type (ADT).	Memory Representation - Introduction to Abstract Data Type	Lect. & Lab.	Quiz
3	Th.:2H Pr.: 2H Tu.:1H	• Understand the Stack ADT and its operations. • Analyze operation time complexity.	Stack The Stack Abstract Data Type - Array Stack - Stack Operations - Time Complexity of these operations	Lect. & Lab.	Homework
4	Th.:2H Pr.: 2H Tu.:1H	• Apply stack operations in problem solving. • Expression conversion and parentheses checking.	Applications of stack operations	Lect. & Lab.	Exam
5	Th.:2H Pr.: 2H Tu.:1H	• Understand the Queue ADT and operations. • Analyze operation complexity.	The Queue Abstract Data Type - Queue operations - Time Complexity of operations	Lect. & Lab.	Quiz
6	Th.:2H Pr.: 2H Tu.:1H	• Learn Circular Queue and Priority Queue. • Implement and analyze operations.	Circular Queue and Priority Queues: - The Abstract Data Type - Operations	Lect. & Lab.	Homework
7	Th.:2H Pr.: 2H Tu.:1H	• Understand the Array List. • Study its abstract data type.	Lists : - Array list - The array List Abstract Data Type	Lect. & Lab.	Exam
8	Th.:2H Pr.: 2H Tu.:1H	• Apply insert, delete, and search operations. • Analyze time complexity.	Lists : - Array list - The array List Abstract Data Type	Lect. & Lab.	Quiz
9	Th.:2H Pr.: 2H Tu.:1H	• Understand Linked List structure. • Learn pointers and	Linked List - Storage Allocation - Pointers - Linked List Abstract Data Type	Lect. & Lab.	Homework

		dynamic memory allocation.			
10	Th.:2H Pr.: 2H Tu.:1H	• Traverse linked lists. • Implement operations: insert, delete, search.	Traversing a Linked List - Linked List Operations	Lect. & Lab.	Exam
11	Th.:2H Pr.: 2H Tu.:1H	• Understand Circular Linked List. • Implement basic operations.	Linked List Design Modification : - Circular Linked List - Circular Linked List Operation	Lect. & Lab.	Quiz
12	Th.:2H Pr.: 2H Tu.:1H	• Traverse circular linked lists. • Compare with linear lists.	Traversing Circular Linked List	Lect. & Lab.	Homework
13	Th.:2H Pr.: 2H Tu.:1H	• Understand Doubly Linked List. • Implement insert, delete, move operations.	Linked List Design Modification : - Doubly Linked List - Doubly Linked List Operation	Lect. & Lab.	Exam
14	Th.:2H Pr.: 2H Tu.:1H	• Implement Linked Stack, Queue, Circular Queue. • Compare linked vs array-based structures.	Linked Stack , Linked Queue , Linked Circular	Lect. & Lab.	Quiz
15	Th.:2H Pr.: 2H Tu.:1H	• Implement all queue operations using linked lists. • Apply queues in real applications.	Queue - Operations	Lect. & Lab.	Homework

2. Course Evaluation

The grade distribution is as follows:

Assessment: Formative 40 marks, Monthly exam 10 marks

Final exam: Theory 50 marks

3. Learning and Teaching Resources

Required textbooks (curricular books any)	
Main references (sources)	[1]: MICHAEL McMillan. Title :" Data Structures and Algorithms Using C#" , 2007 [2]: Thomas H. Cormen , CHARLES E. LEISERSON Title :"Introduction to Algorithms " , third edition ,2009
Recommended books and references (scientific journals, reports...)	Special requirements (include for example workshops, periodicals, IT software, websites)
Electronic References, Websites	